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CONSIDERATION OF PLANS AND PROGRAMMES TO SUPPORT THE SUSTAINABLE DEVELOPMENT OF SMALL ISLAND DEVELOPING STATES AND THE UTILIZATION OF THEIR MARINE AND COASTAL RESOURCES, WHICH INCLUDES MEETING ESSENTIAL HUMAN NEEDS, MAINTAINING BIODIVERSITY AND IMPROVING THE QUALITY OF LIFE FOR ISLAND PEOPLE, AS WELL AS MEASURES THAT WILL ENABLE SMALL ISLAND DEVELOPING STATES TO COPE EFFECTIVELY, CREATIVELY AND IN A SUSTAINABLE MANNER WITH ENVIRONMENTAL CHANGES AND TO MITIGATE THE IMPACTS ON AND REDUCE THE THREATS POSED TO MARINE AND COASTAL RESOURCES

Sustainable development of small island developing States**

Report of the Secretary-General

CONTENTS

		Paragraphs	Page
I.	OVERVIEW OF THE SPECIAL PROBLEMS OF SMALL ISLAND DEVELOPING STATES	1 - 19	4
A.	Current trends in the socio-economic development of small island developing States	1 - 6	4

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CONTENTS (continued)

		Paragraphs	Page
	1. Economic trends	1 - 4	4
	2. Trends in social development	5 - 6	5
B.	Major constraints to the sustainable development of small island developing States	7 - 8	5
C.	Nature and magnitude of the special vulnerabilities of small island developing States	9 - 14	7
	1. Special vulnerabilities of small island developing States	9 - 11	7
	2. Indicators of vulnerability	12 - 14	8
D.	Options for sustainable development	15 - 19	9
II.	PRIORITY AREAS FOR THE SUSTAINABLE DEVELOPMENT OF SMALL ISLAND DEVELOPING STATES	20 - 60	10
A.	Environmental problems of small island developing States	20 - 29	10
	1. Climate change and sealevel rise	21 - 22	10
	2. Natural and environmental disasters	23	11
	3. Waste problems	24 - 29	11
B.	Management of resources of small island developing States	30 - 58	12
	1. Coastal and marine resources	31 - 34	13
	2. Freshwater resources	35 - 37	14
	3. Land resources	38 - 48	15
	4. Energy resources	49 - 52	17
	5. Tourism resources	53 - 57	18
	6. Biodiversity resources	58	19
C.	External transport constraints	59 - 60	19

CONTENTS (continued)

		Paragraphs	Page
III.	NATIONAL, REGIONAL AND INTERNATIONAL IMPLEMENTATION ..	61 - 122	20
	A. National implementation	61 - 116	20
	1. Major ingredients for sustainable development in small island developing States	63 - 68	21
	2. Environmental policy mechanisms: regulatory measures and economic instruments	69 - 71	23
	3. Managing environmental problems	72 - 79	24
	4. Management of resources: sectoral policies and measures	80 - 102	26
	5. Capacity-building for development and environmental management	103 - 111	33
	6. Enhancing external transportation facilities	112 - 116	35
	B. Regional implementation	117 - 121	37
	C. International implementation	122	38

I. OVERVIEW OF THE SPECIAL PROBLEMS OF SMALL ISLAND DEVELOPING STATES

A. Current trends in the socio-economic development of small island developing States

1. Economic trends

1. Small island developing States (SIDS) are a diverse group of countries with different resource endowments, different geographical situations in relation to major markets, and different land and sea areas. Some, such as Aruba, the Bahamas, Bermuda, Cyprus and the United States Virgin Islands, are classified as high-income countries, while others, such as Cape Verde, the Comoros, Haiti, Kiribati, Maldives, Samoa, Sao Tome and Principe, Solomon Islands, Tuvalu and Vanuatu are classified as least developed countries.

2. The smallest and most remote countries include some that do not have any significant domestic sources of productive income and are either entirely or extremely dependent on external rental income and entitlements. Their main sources of external income are aid and remittances, but other sources include income from trust funds, royalties from fishing rights, philatelic sales and military expenditures of foreign military personnel based on their soil. Twelve of them are entirely dependent on external rental income. A few SIDS - usually the larger ones, as would be expected - have more diversified economies. A particular feature of their growth in the 1980s has been the development of export-processing industries. The expansion of export processing in these countries has been made possible by special market access in some cases, considerable foreign investment and relatively well-educated labour forces. The majority of SIDS lie between the extremes of the very small, remote Pacific SIDS and the larger, more diversified ones. The growth of this group of countries in the 1980s was based on service exports, particularly tourism and financial services, and the export of a few primary commodities.

3. Tourism is the most important service export specialization of many island developing countries, particularly in the Caribbean. In 1989, for 28 island countries with a population of less than 5 million, tourist earnings exceeded 75 per cent of total export earnings in 5, and constituted over 30 per cent of total export earnings in 15. With respect to the 22 island developing countries in this sample for which trend data were available, tourist earnings in 13 constituted a higher proportion of export earnings in 1989 than in 1980 and in most of the others tourist earnings as a proportion of total export earnings remained stable during the period between these years. The primary commodity exports that are important to island developing countries include bananas, sugar, cocoa, coffee, vanilla, spices, nutmeg, fish, wood and a few minerals (copper, gold and phosphates, which are important, however, to only very few of them).

4. Economic growth trends in SIDS in the 1980s were generally favourable on average when compared with those of other developing countries, but economic performance was mixed. Some SIDS experienced relatively rapid growth in gross national product (GNP) per capita which increased by over 4 per cent per annum in Mauritius, Antigua and Barbuda, Cyprus, Grenada, Maldives, Saint Kitts and

Nevis, and Saint Lucia. A number of others, notably Jamaica, Trinidad and Tobago, Fiji and Sao Tome and Principe, experienced declines in growth rates, with GNP per capita declining by 1 per cent per annum over the course of the decade. Moreover, several SIDS experienced significant year-to-year volatility in economic growth. This was particularly true of Pacific island economies, which experienced enormous volatility in growth rates in the 1980s, with swings in those rates of 10-20 per cent occurring with disturbing regularity. Individual countries of the Caribbean region also experienced considerable volatility in the growth of real GNP.

2. Trends in social development

5. In general, the economic growth of SIDS has been associated with improvements in social well-being. A simple measure of this is provided by country ranking according to the human development index (HDI) of the United Nations Development Programme (UNDP). Their high HDI ranking reflects the fact that many SIDS have relatively low levels of infant mortality, relatively high life expectancy and relatively low levels of illiteracy. The incidence of poverty is high and pervasive in the SIDS that are in the least developed category. Even in the higher-income countries, however, a high incidence of poverty persists, particularly in rural areas. Lack of productive employment opportunities is a general problem. There is also considerable social tension in some SIDS having pronounced ethnic diversity - a legacy of the importation of labour from various parts of the world to work on plantations in the colonial period. Moreover, costs of providing health, education, law and order, and welfare services are unusually high, particularly in the archipelagic SIDS.

6. Standards of living and social well-being are much lower in the island developing countries that are classified as least developed. Indicators of daily caloric intake per capita and figures for the percentage of the population with access to safe water reflect a situation that is generally worse in these countries than in other small island developing States. However, available figures show that average life expectancy at birth is over 60 years of age in all the least developed SIDS except the Comoros. The growing need for effective human resources development (HRD) places considerable strain on government budgets. Government institutional capabilities are overburdened with the tasks of satisfying immediate HRD needs through nationwide delivery systems for education, health care and employment security, and of dealing with institutional HRD needs for designing, managing, administering and updating those systems as demands change.

B. Major constraints to the sustainable development of small island developing States

7. Despite their heterogeneity, SIDS have a number of common characteristics. They have a small land area and are constrained by a paucity of natural resources. Their populations are small and their age composition is strongly affected by the tendency of islanders who seek work to emigrate on account of inadequate employment opportunities at home. Smallness of territory and population makes for small economies lacking in diversification. Although populations are not large, the small land area can lead to very high population

densities and related environmental stress. The economies of SIDS are very open ones. Openness together with preferential market access to many developed market economies allows them to avail themselves of economies of scale, the realization of which, however, requires specialization in a very narrow range of products; and this heightens their vulnerability to external demand shocks whose impacts are as a consequence felt much more strongly in SIDS than in other, more diversified economies. Likewise SIDS are extremely vulnerable to increases in international prices on account of their high import-dependence. The fact that many of them are located off the main sea and air routes results in a swelling of unit costs of freight and passenger fares, which is further exacerbated by their relatively small demand for sea and air transportation relative to the size of ships and aircraft. They all suffer from scale diseconomies in administration, training, utilization of high-level skills and most infrastructures, particularly transportation infrastructure. These factors combine to make the economies of SIDS high-cost economies. Many of them are also prone to frequent natural disasters which have particularly devastating impacts on their economies because of their smallness.

8. In addition to these inherent constraints, SIDS are confronted with some emerging ones. The cumulative effects of environmental degradation in SIDS, which is elaborated upon in section II, are posing a constraint to long-term growth. The sustainability of growth is also being significantly affected by changes in the global economy. Recent trends in the global economy - including globalization of production, the emergence of new economic spaces such as the North American Free Trade Area, new forms of competition based on flexible specialization, organizational and technical innovations in international shipping, and the increasing importance of micro-electronics and telecommunications infrastructures - all pose new challenges to SIDS. These developments, however, are not all negatives, as some, such as innovations in telecommunications and micro-electronics, can offer opportunities for new types of economic activity on islands. Moreover, new forms of competition, based on customized products rather than prices, point towards the viability of niche-filling export activities in SIDS. Small island developing States are increasingly anxious about some looming threats in developments within the international situation, notably, the danger of erosion of trade preferences and reduction in aid, which are likely to add to their economic and environmental pressures. In this regard, it is worth emphasizing that whatever their sources of growth, SIDS are in general highly dependent on overseas development assistance. Relatively high levels of per capita official development assistance (ODA) have allowed most SIDS to maintain high levels of gross domestic investment in the 1980s despite relatively low levels of gross domestic savings. They have also helped them to cope more easily with chronic current account payments deficits. The high degree to which many island developing countries depend on ODA raises serious questions about the sustainability of their growth in case of possible aid shocks.

C. Nature and magnitude of the special vulnerabilities of small island developing States

1. Special vulnerabilities of small island developing States

9. Small island developing countries are acutely vulnerable to a variety of exogenous factors that pose severe constraints on their sustainable development. Small islands in cyclone-prone regions are frequently hit by cyclones with devastating economic consequences. In dry areas, the limited water-retaining capacity of islands makes many of them susceptible to drought. They have small catchment areas with the consequence that a high proportion of rainwater and eroded soil is commonly lost to the sea. On account of their small size, adverse impacts of human activity on the natural environment can occur rapidly. That island ecosystems have often evolved in isolation has led to the development of rare endemic species that are an important part of the world's genetic resources; but the fragile ecosystems of islands are quickly devastated by epidemics introduced from outside, with consequent loss of such valuable resources. A particularly important threat to SIDS is the prospect of climate change and sealevel rise. The frequency of cyclones, storms and hurricanes is expected to increase with climate change. While small islands do not contribute to global warming, they would be the most affected by sealevel rise.

10. A vulnerable economy may be defined as one which (a) is subject to frequent shocks that are unpredictable and not controllable at the national level and (b) has low resilience, in the sense that it has little internal capacity to absorb damages caused by shocks and to continue normal economic life. From a long-term perspective, a vulnerable economy is one in which development momentum, and thus the well-being of the population, cannot be sustained, because the economy cannot easily adapt to changing costs and prices in international markets and/or the environmental resources on which activities are based are easily degraded.

11. Vulnerability is a problem faced by many developing countries, but there are certain vulnerabilities that apply with greater force to SIDS. These are the result of some combination of:

(a) Their proneness to natural disasters, as outlined above;

(b) The extreme openness of their economies, which makes them particularly susceptible to various kinds of external economic and policy shocks, including fluctuations in prices and shifts in demand for primary commodities, changes in the rules of access to developed country markets, changes in tourism demand, and shifts in aid policies;

(c) Their low resilience, in the sense of their inability to recover easily from shocks, which is the result of a number of factors, including paucity of productive natural resources, limited institutional and human resource capacities, poor and inadequate infrastructures, low debt-servicing capacity, inflexible specialization and low diversification of the output-mix and export structures, reflecting the constraints posed by their factor endowments.

2. Indicators of vulnerability

12. Work on the methodology for identifying and measuring special vulnerabilities is at a very preliminary stage even for SIDS, where the evidence of vulnerability is usually more obvious. Where most economic activity is directly dependent on environmental conditions and development highly influenced by exogenous forces, both economic and environmental, a family of indicators is needed to bring out vulnerabilities effectively.

13. Indicators of vulnerability would need to take into account the impact of such considerations as:

(a) Natural disasters, involving:

(i) Location in relation to hurricanes, cyclones and other tropical storms and/or volcanic/earthquake fault lines;

(ii) Frequency of disasters, including tsunamis;

(iii) Logistic problems, including remoteness related to the provision of rapid disaster relief and reconstruction;

(iv) Ratio of flat coastal plain to elevated ground;

(b) Locational factors, including:

(i) Situation in relation to shipping routes;

(ii) Logistic and other impediments to dealing with emergencies, such as oil and chemical spills;

(c) Environmental stress, involving:

(i) Rate and extent of loss of species and ecosystem functions, for example, in coral reefs and mangroves;

(ii) Potential for rehabilitation/regeneration of degraded areas and systems;

(iii) Potential for relocation of affected economic activities or substitution of means of livelihood;

(d) Economic factors, including:

(i) Extent of import dependence and export instability;

(ii) Extent of diversification of economic base;

(iii) Ability to save and generate capital investment in relation to requirements for infrastructure development;

(iv) Extent of ownership of capital and national control over resources, and negotiating capacity;

(v) Impact of migration in terms of loss of social capital invested in emigrants;

(vi) Aid as a proportion of total capital investment.

14. Refinement of the key indicators of vulnerability will make an important contribution to national development planning, contingency planning, human resource development strategy and other key aspects of capacity-building, as well as to the establishment of priorities for regional and subregional cooperation, including the coordination of aid. A meaningful measure of vulnerability could also heighten the sensitivity of the international donor community to the special problems of SIDS. Attempts have been made to construct a composite index of vulnerability. However, the work in this area does not yet have operational applicability and no attempt has yet been made to construct an index that integrates the ecological fragility and economic vulnerability of SIDS.

D. Options for sustainable development

15. In brief, the basic constraints on the sustainable development of SIDS are lack of land-based and proved marine resources; susceptibility to natural disasters; fragility of ecosystems; depletion of non-renewable resources and, in some, an acute problem of obtaining freshwater supplies; limited resource assessment capabilities; high costs of infrastructure and public service provision associated with a lack of economies of scale; high internal transport costs, and deteriorating inter-island transport services in island States that are archipelagos; poor accessibility to markets and sources of supply; a demographic structure with a large proportion of young and old people because of emigration; shortage of skilled personnel, both entrepreneurial and administrative, on account of emigration and the small available pool of talent; high dependence on foreign capital but little attractiveness for foreign investment; and small internal markets.

16. External factors strongly influence development in SIDS. For the smallest and most remote SIDS the sustainability of the well-being of island people depends on maintaining external rental incomes and entitlement of various kinds. For the SIDS that are highly specialized in primary commodity exports, or tourism, or some combination of both, the prospects for the sustainability of growth depend partly on environmental policy, as both agriculture and tourism depend on the maintenance of environmental assets, and partly on trade preferences. Tourist demand in individual island developing countries is sensitive to sudden changes in their image, and is adversely affected by increases in long-distance air fares. For SIDS in which there has been an expansion of export manufacturing, the sustainability of growth depends on import quota regulations in rich countries, and the outcome of the intense competition to attract footloose investment. Despite the importance of external factors, SIDS have a limited capacity to monitor international economic changes.

17. The prospects for sustainable development of SIDS depend on actions to overcome, and where possible to remove, key constraints. Some of the constraints are binding, but not all. At the national level, it is possible through careful planning to develop adequate human resources capability to

respond flexibly and creatively to coping with economic and environmental shocks and challenges. That capability is vital for strengthening the resilience of SIDS, but its development will require national efforts and regional and subregional cooperation. In promoting sustainable development, SIDS do not have the option of insulating their economies and ecosystems from outside forces. The nature of these countries is such that trade in goods and services, international capital flows and international migration will continue to play a significant role in their patterns of development. Sustainable development can be best promoted through an outward-oriented, carefully devised and flexible strategy that seeks high-value niches in export markets. This would be feasible in all except the smallest and most remote SIDS which may well have to continue to depend on traditional sources of income for quite some time.

18. There are various sustainable development options open to SIDS, some of which are export of services, such as tourism, offshore financial activities and electronic data entry and flexible specialization as a method of organizing export production of light manufactures that offers the potential to increase their international competitiveness and responsiveness to external economic changes. The essence of flexible specialization as an approach to organizing production is competing on the basis of product rather than price by exploiting particular niches in markets for a variety of small-scale but high-value-added products of light-manufacturing industries. These types of activities, if properly managed, have minimal, if any, adverse environmental consequences. The marine resources of lagoons and reefs, and more broadly of exclusive economic zones (EEZs), offer important development options although the potential of EEZs varies among countries.

19. In SIDS that are endowed with agricultural potential, agriculture can still offer an important source of sustainable growth given adequate intensification, diversification and well-managed use of modern inputs. In countries that are endowed with mineral resources, mining will certainly continue as a source of growth, but care should be taken to avoid adverse environmental consequences of mining operations.

II. PRIORITY AREAS FOR THE SUSTAINABLE DEVELOPMENT OF SMALL ISLAND DEVELOPING STATES

A. Environmental problems of small island developing States

20. The present section encapsulates the major environmental problems confronting SIDS. Policies and measures for their management at the national, regional and international levels are discussed in section III.

1. Climate change and sealevel rise

21. Global warming resulting in substantial climate change and sealevel rise poses the most serious environmental threat to SIDS with implications for pervasive socio-economic impacts. Among the potential effects of climate change and sealevel rise are retreat of shore lines and loss of agricultural land with which they are very meagrely endowed, increased flooding and destruction of salinas, salination of coastal aquifers and reduction of already very limited

freshwater availability, and increased mortality of some coral reefs. Climate change will also be accompanied by changes in rainfall patterns which may increase flooding of coastal plains owing to increased rainfall, and this results in damages to human settlements and a variety of coastal economic infrastructures, and destruction of mangrove forests. Elevated temperatures would lead to an increased incidence of diseases and increased evaporation of surface water resulting in higher incidence of droughts, and to the bleaching of coral reefs.

22. Island countries will be particularly vulnerable to the impacts of the climate change and sealevel rise described above because they include numerous low-lying islands and atolls, house high proportions of their populations and carry out major economic activities in coastal zones, depend on very limited natural availabilities of freshwater, have very limited areas of arable land and are at great risk from frequent inclemencies of weather such as storms. The smaller and more coastally oriented islands would bear the brunt of sealevel rise. Sealevel rise would also have severe socio-economic impacts even on larger islands whose economies rely heavily on fishing and tourism.

2. Natural and environmental disasters

23. Most SIDS experience frequent natural disasters caused by hurricanes and typhoons, earthquakes and landslides. On account of their locations in the cyclonic belt, a number of SIDS are frequently hit, in particular by cyclones. In some cases natural disasters threaten the very survival of small islands. The major effects of natural disasters include devastation of the agricultural sector, destruction of entire village settlements, disruption of high proportions of communication facilities and injuries to and/or death of large numbers of people. Although natural disasters also occur in non-island countries, the impact of natural disaster in a small island tends to be larger in terms of proportions of the area and people affected as well as in terms of per capita losses. Often it takes years to rehabilitate damaged infrastructures and human settlements, with such rehabilitation absorbing high proportions of government expenditures and personal savings, and with obvious adverse impacts on the sustainability of consumption, investment and growth.

3. Waste problems

24. The impact of wastes on human and environmental health has been on the rise in most SIDS as a result of growing populations and increasing imports of resistant and hazardous materials on the one hand and lack of resources and space for the safe disposal of wastes on the other. The major waste problems occur in urban areas, coastal areas and the seas.

25. Urbanization has proceeded at a rapid pace in some, but not in all, SIDS. In countries where urbanization has taken place at a rapid pace, urban stress affecting human health, particularly that of the urban poor who live in unserviced areas and often make a living from collecting solid wastes, has increased. Typical problems have been those of sanitation facilities' lagging behind demand, insufficient collection and disposal of solid and toxic wastes, inappropriate disposal of sewage, discharge of industrial effluents in inland

water bodies, coastal waters and on the ground, and in some cases even air pollution. Sewage, urban solid wastes, and industrial effluents all contain various kinds of pollutants and even hazardous substances that contaminate surface water and groundwater.

26. In many SIDS, the coastal areas are the sites of many economic activities involving, for example, ports, sewage treatment plants, industries, tourist hotels and human settlements. Ports are generally located within the hub of urban settlements and are predisposed to chemical and sewage pollution. For instance, inappropriate facilities at ports for loading and discharge of oil result in frequent considerable oil spillage. Overloaded sewage treatment plants, whether inland or on the coast, discharge raw or inadequately treated sewage into the sea. Sewage and other wastes from hotels are normally discharged untreated into the sea.

27. In some regions, where there is high-density marine traffic within proximity to islands, carrying hazardous liquid and solid wastes and materials, including nuclear fuels, the risks of accidental pollution is very high. Even in the absence of accidents, operational pollution (the intentional discharge of harmful wastes generated from normal shipboard operations) is high. Where cruise ship operations are frequent, large amounts of garbage and sewage are routinely dumped into the seas of island countries.

28. An emerging problem is that of transboundary waste's reaching SIDS. In so far as environmental and safety laws in industrialized countries have become more stringent and the cost connected with hazardous wastes has mounted, there has been an increase in the exports of hazardous wastes to SIDS that have neither the resources, nor the technology, nor the room for their safe disposal. As far as the receiving SIDS are concerned, the need for foreign exchange often prevails over considerations of safety.

29. Marine pollution if allowed to proceed unchecked poses a major threat to the sustainable development of SIDS. It is likely to undermine their two major resource-based growth industries, namely, nearshore fishing and harvesting of marine plants, and tourism.

B. Management of resources of small island developing States

30. In view of the fact that the land masses of SIDS in their entirety constitute coastal zones and are coming under the growing pressure of competing demands for various uses which give rise to both positive and negative externalities, the best approach to the rational management of resources in SIDS would be so-called integrated coastal zone management (ICZM). In SIDS, however, resource scarcity will preclude the establishment of a complex institutional structure to carry out integrated coastal zone management. The practical approach for them would be to rely on sectoral management, taking into account the major intrasectoral and intersectoral linkages through intrasectoral and intersectoral coordination. The central objective should be to rationalize resource management so as to maximize the benefits of opportunities offered by complementarities which will make for growth and to minimize the effects of negative externalities which cumulatively build up constraints to growth. Sustainability of natural resources will require above all the minimization of

negative externalities. In the case of exhaustible resources, account should also be taken of intergenerational equity. This is particularly important in SIDS, on account of the paucity of the exhaustible mineral resources with which a few of them are endowed. This subsection discusses along broad lines the opportunities for and constraints on growth relating to natural resources. Policies and measures for their sustainable development are discussed in section III.

1. Coastal and marine resources

31. As mentioned above, the coastal areas of SIDS generally constitute a major locus of economic activity. They are the sites of major activities such as those involving ports and terminals, sewage treatment plants, electric power generation, non-metallic (particularly sand, gravel and stone) mining and tourism. Most of these activities generate considerable negative externalities, the most important being disfigurement of coastlines and marine pollution and pollution of coastal freshwater aquifers. Other activities such as land reclamation and lagoon dredging deplete coastal resources permanently. Poor land management and forestry practices contribute to loss of fish habitats. Excessive inshore fishing tends to deplete inshore fisheries.

32. The exclusive economic zones of SIDS generally comprise very large areas and amount to high proportions of their total area. For very small islands, offshore marine resources may represent the sole opportunity for significant economic prosperity. The main marine resources of SIDS consist of marine fisheries, and other living marine resources. Some minerals are known to exist in the EEZs of SIDS, but their marine mineral potential remains largely unknown. Fisheries resources are not evenly distributed among SIDS. Therefore the size of the EEZ of a small island developing State is not an adequate measure of its fishery potential, and opportunities for developing industrial fishery is open only to some SIDS, mainly those located in the Indian and Pacific oceans.

33. In most SIDS, however, the potential for inshore fishing in reefs and lagoons is considerable. Reefs are especially rich in biomass and are known to be the most productive of all ecological systems on the planet, capable of supporting enormous amounts of fish. Of the other living resources of the sea with economic development potentials, algae seaweeds and other aquatic plants are the most important. Seaweeds constitute highly nutritious food, and are also used for fodder and fertilizers, and in the development of new drugs and in industrial applications. The economic potential of these resources is considerable.

34. Most SIDS currently depend heavily on their marine renewable resources. The degree of dependence, however, is higher for the coralline atolls whose agricultural potential is minimal than for the larger islands. In the coralline atolls, the nearshore marine resources support a variety of human activity often of a subsistence nature based on reef and lagoon fishing. As discussed above, however, the general tendency has been towards the degradation of nearshore marine resources from land-based (including coastal) activities as well as maritime activities affecting the potentials of reefs and algae, two important marine sources of growth for most SIDS.

2. Freshwater resources

35. Small island countries have severe freshwater problems both in terms of quantity and quality because of their small size and certain geologic, topographic and climatic conditions. They are particularly vulnerable to fluctuations in natural availability and contamination of freshwater supplies.

36. Among island countries, the low-lying atolls suffer the most from water scarcity. On account of their smallness the total amount of rainfall is low and groundwater supplies are limited to lens-shaped bodies that are very susceptible to the vagaries of nature and variations in freshwater availability. These small islands do not have adequate opportunities for surface storage and suffer much more from the effects of droughts than many of the larger islands. Several other SIDS also suffer from frequent droughts and perennial water scarcity. On the high volcanic islands, however, rainfall is in many cases abundant, but access to clean water is often restricted by lack of adequate storage facilities and delivery systems. On these islands there are few good storage sites and rainfall is rapidly discharged to the seas. Flash flooding, associated with tropical storms, is a particular problem where catchments are small and rainfall is high. The constraints placed by nature on freshwater in SIDS have been exacerbated by man. Deforestation of watershed areas has led to a deterioration of watersheds further limiting freshwater availability in a number of SIDS. In view of the increasing demand for freshwater, on the part of growing populations and as a result of the needs of economic development, competition for water from various sectors - households, agriculture and industry - is becoming increasingly intense, and unless efforts are made to increase supplies, water availability may become a binding constraint to the growth of water-intensive sectors such as agriculture and even tourism.

37. Concern about water in SIDS relates not only to quantity, but also to quality. Like water quantity, water quality in SIDS is affected both by nature and by man. The groundwater resources of coral atolls and other low-lying limestone islands are in general very susceptible to pollution owing to the relatively thin and permeable unsaturated soil layer which during rainy seasons allows channels to be created that serve as conduits for contaminants entering aquifers. In some islands, particularly the high volcanic islands, and those that have so far developed their agricultural potential the least, and where urbanization is at an incipient stage, water quality is still acceptable. Generally, however, water quality has undergone severe deterioration through anthropogenic interventions. Freshwater supplies have been polluted by a variety of public and private sector activities such as misuse of agricultural chemicals, and discharge of sewage and industrial effluents in freshwater bodies, which have obvious adverse consequences for human health, as well as for aquatic plants and animals. Anthropogenic causes of water scarcity and degradation are attributable to inappropriate agricultural and industrial policies, haphazard urban development and lax urban governance. Pollution of sources of drinking-water in particular entails enormous costs to Governments with respect to their safely supplying such water to the public.

3. Land resources

38. The very limited land resources of SIDS have come increasingly under intense pressure for agricultural development. At the same time, competition for land resources has increased from the need for adequate forestry resources, mining operations, tourism and human settlements.

39. In many SIDS, on account of topography and local climate, arid conditions prevail. Aridity makes agriculture a high-cost venture and actually precludes significant agricultural activity. In some SIDS, the topsoils are very thin and susceptible to rapid erosion. This condition serves as a limiting factor for agricultural diversification and calls for island-wide soil conservation measures raising the cost of sustainable agricultural production. In others, however, particularly those that are of volcanic origin, high elevations and rich soils are conducive to high-level land productivity and agricultural diversification.

40. The pattern of land tenure varies widely among SIDS. In several, communal ownership still prevails; in others, tenure is typified by private ownership. Communal tenure systems are associated with traditional modes of agricultural production, and this makes for living at subsistence levels. Those systems, however, are more easily amenable to the establishment of protected areas.

41. Over time, as necessitated by population growth in predominantly agrarian SIDS, agricultural expansion has made the greatest claim to land resources. Low-technology, low-yield agriculture has carried agricultural expansion into marginal land. In some SIDS, subsistence farming is still extensive. By and large, however, commercial or cash-crop farming aimed at the export market has been in the ascendant. The need for raising export earnings in SIDS which are typically import-dependent because of their limited scope for economic diversification does not need elaboration. In many SIDS the growth of commercial farming has been accompanied by the establishment of large-scale plantations through either land consolidation, deforestation or both. Export earnings have risen but not without a price. Deforestation has proceeded to the extent that not many SIDS have much natural forest left. The most harmful impacts of deforestation have been soil erosion which is having a cumulative adverse impact on agricultural productivity, reduction of terrestrial biodiversity, and deterioration of watersheds. Deterioration of watersheds in SIDS, which typically have meagre natural freshwater availability and where demand for water is growing, has serious adverse implications for the sustainability of growth. Extensive deforestation, which has taken place mainly for purposes of agricultural development, will also impact severely on the energy sector. In view of the fact that in most SIDS the main source of household energy supply, particularly in the rural areas, is fuelwood, the depletion of the source of fuelwood will necessitate increased imports of expensive hydrocarbons which will swell their import bills.

42. Commercial farming, particularly large-scale plantation agriculture, has been characterized by the introduction of modern inputs such as irrigation, chemical fertilizers, herbicides and pesticides in order to raise agricultural yield. Ill-conceived irrigation systems, irrational use of water, and misuse of agricultural chemicals, however, have resulted in land degradation and pollution of inland water bodies, groundwater and seawater. The expansion of modern

agriculture has also resulted in the marginalization of certain groups of people who have been driven into marginal lands where out of sheer necessity and without the benefits of modern inputs they eke out a subsistence living by overusing and thus further degrading those lands.

43. A logical accompaniment of population growth has been increased need for land for human settlements. The pressure of human settlements is felt most strongly in urban areas where land is scarcer and in the coastal zones of SIDS. While the growth of human settlements is unavoidable, a lack of land-use planning has led to the encroachment of human settlements on scarce fertile land, and as discussed above, inadequacies of services and sanitation facilities have exacerbated environmental problems which have direct impacts on human health.

44. Even the smallest islands possess some types of mineral resources, though not always those that enter international trade. Their nature depends upon the bedrock geology of the island; and as a general rule the bigger the island the more diverse its geology and, consequently, the better its chance of having significant mineral deposits. In some island countries, for instance Jamaica and Nauru, mining is the mainstay of the economy; in others, it contributes significantly to domestic output and employment.

45. Mineral deposits fall into three main categories: energy minerals, metallic minerals and non-metallic or industrial minerals. Energy minerals include hydrocarbons such as petroleum and coal, and radioactive minerals. While the smaller islands are unlikely, for geologic reasons, to have significant resources of coal or nuclear materials, their geography may include extensive offshore areas - exclusive economic zones - that may have potentials for oil and gas. Islands with major known petroleum resources include Trinidad and Tobago, Barbados, Papua New Guinea and Bahrain; the potentials of others still await geologic assessment.

46. Metallic minerals including precious and base metals are of major economic importance to some island countries. Because minable metal deposits on an industrial scale are frequently the consequence of complex geologic processes not commonly found together on a single island, and represent metallogenic events that are rare even in a large country, small islands tend not to have metal mines. Nevertheless, there are several exceptions. Two of the world's largest metallic deposits, Bougainville (copper-gold) and Lihir (gold), are on small islands forming part of Papua New Guinea. The French island territory of New Caledonia is a major producer of nickel and a source of high-quality chrome ore. For Jamaica, bauxite and alumina are the mainstay of the economy. Fiji produces significant amounts of gold, and Cyprus copper.

47. Non-metallic minerals have been the foundation of the economies of every industrialized country, because of their wide and essential role in applications ranging from construction to chemicals, and from glass to paper manufacture, and in agriculture and electronics. The value of world production of industrial minerals far exceeds that of the metallic ones. Moreover, and of the greatest interest to island economies, non-metallic minerals are found even on the smallest island. The most notable example is the tiny island of Nauru consisting basically of marine phosphate mined for fertilizer. In Cyprus proceeds from bentonite clays and earths are much greater than those from the

better-known copper mines. There is no island that does not offer at least some materials, such as sand, gravel and stone, for construction.

48. In SIDS that are fortunate in having some endowments of metallic and energy minerals, these resources have helped export earnings, but inadequate attention has been paid to the technology used in mining operations. As a result, those operations have resulted in the disfigurement of landscapes, and haphazard disposal of toxic materials used in mineral processing has contributed to the degradation of water resources. Non-metallic mining of one kind or another is pervasive in SIDS and contributes enormously to their development. Again, unplanned and unsystematic extraction of non-metallic minerals has disfigured coastlines and facilitated the intrusion of salt water into coastal freshwater aquifers by the disruption of the interface.

4. Energy resources

Indigenous energy resources and energy supply

49. With the exception of Barbados, Bahrain, Papua New Guinea, and Trinidad and Tobago, there is no production of petroleum in small island developing States and territories and virtually no exploration activity has been carried on in these countries in recent years. Island arc basins in the Caribbean Sea and the south-west Pacific have been investigated for their hydrocarbon potential. However, since 1985, all licensed acreage in the Caribbean Sea - in the Bahamas, Barbados and the Netherlands Antilles - has been surrendered. Elsewhere, and only in the Seychelles, about 20,000 square kilometres (km^2) is still under licence for exploration where seismic surveys of about 4,700 line-km were last conducted in the period 1987-1988. In most of the island States and territories in the south-west Pacific, only preliminary reconnaissance exploration activities have been carried out, with exploratory drilling only in Fiji and Tonga. As far as other major hydrocarbons, namely coal and radioactive minerals, are concerned, there are virtually no known deposits in most of the small island countries.

50. Of the renewable sources of energy, biomass accounts for the major share in small island countries. Fuelwood is most commonly used as cooking fuel, especially in rural households. Most cooking fuelwood is obtained at no financial cost from forests. Few island countries, however, carry out any sizeable commercial production of fuelwood. In view of the fact that very few island countries have forest areas in excess of 20 per cent of their land area, heavy dependence on fuelwood has implications for deforestation and biodiversity. Also widely used are coconut residues (shells, husks and stem wood) and residues from coffee, cocoa and other minor crops such as maize, cassava, peanuts and rice. In those island countries where sugar cane is grown in large quantities, considerable use is made of bagasse as fuel for sugar mills, notably in Fiji, where about 30 per cent of the peak electricity demand, including that for electricity used in the sugar mills themselves, is met by bagasse.

51. Regarding new and renewable sources of energy, most islands have abundant solar, wind and ocean resources, and considerable hydropower and geothermal potential. Some SIDS may still have some as yet undeveloped hydropower

potential. However, in spite of efforts to develop indigenous energy resources, using a variety of pilot projects, including biogas from animal dung, biomass gasifiers, alcohol fuel, small-scale wind systems and solar photovoltaics, the overall contribution of new and renewable sources to the energy balance of most SIDS has been minimal. Hydropower has been developed to various extents in some 10 SIDS. More recently, the use of solar energy has been relatively successful in some SIDS, particularly in the Pacific islands.

52. On account of the paucity of their energy resources, SIDS are heavily dependent for their commercial energy needs on imported oil which is often supplied in small shipments and consequently at high transportation costs. Oil accounts for about 65 per cent of their total commercial energy needs and it is the only source of primary commercial energy in 28 SIDS. The share of petroleum imports in the total import of SIDS is generally very high.

5. Tourism resources

53. In many small island developing countries, tourism represents a significant segment of the economy, and its development is based on the recognition of environmental beauty as a valuable natural resource. In some SIDS, tourism has been the dominant sector because of the difficulty of diversification, not only towards manufacturing or non-tourism services activities, but also among activities based on natural resources. Generally, tourism offers considerable potential for sustained growth in SIDS.

54. Tourism development can, however, be hindered by island-specific handicaps such as smallness, remoteness or an archipelagic topography. In very small island developing States, the unavailability of economies of scale explains the absence of necessary infrastructure or means of transport. In the outer islands of archipelagos, an unspoiled environment can remain unexploited because of the absence of regular means of access, landing infrastructure or basic utilities. In the absence of these infrastructures, the cost of investment in hotels will be considerably inflated by the necessity of providing for various joint facilities such as ferry boats, jetties, desalination plants, electricity generation facilities, special telecommunications equipment and so on.

55. Tourism development can also be hampered by island-specific risks. Physical risks such as natural disasters involve impacts ranging from damage to hotel facilities to complete destruction of large infrastructures such as airports, cruise ship terminals and roads. Economic risks affecting tourism may relate to the foreign tourist demand. Tourist demand with a relatively high income-elasticity, that is, demand other than the affluent-tourist one, may suddenly fall off as the result of economic recession in the source market and thereby amplify the seasonality effect characteristic of tourism. Unfavourable exchange rate changes, or sociopolitical factors, may also pose serious economic risks. Such risks are particularly burdensome to SIDS with little economic diversification.

56. On the other hand, in an economy relying significantly on tourism, the economic structure can be positively influenced in many different ways by the multiplier effect of tourist expenditure. This depends on the import propensity of the tourism economy, which itself depends on the nature of tourist demand.

The more the economy is capable of producing agricultural, fish and manufacturing products locally to meet tourist demand, the greater the multiplier effect will be, because of fewer revenue leakages into imports. Most SIDS, however, may not be able to meet an upper-market tourist demand from local production. Such demand must be met with regular flows of imports of prime-quality consumer products which will tend to reduce the multiplier effect.

57. While tourism can be a major growth sector in many SIDS, if left to market forces, its pressure on the natural environment can lead to considerable physical degradation which in due course will threaten the viability of the tourist industry itself. Some of the environmental impacts of tourism are reclamation of wetlands and mangroves to facilitate hotel construction, erection of piers and marinas, and discharge of sewage and other solid wastes into nearshore waters. The cumulative environmental effects of these activities can lead to marine pollution, and coastal and marine biodiversity reduction, resource depletion and human health problems. In view of these considerations, a sustainable development strategy for tourism is essential.

6. Biodiversity resources

58. The full extent of the biodiversity of small island countries remains unknown. There is evidence, however, that considerable terrestrial species diversity exists in island countries. Many of the plants and animal species of islands are endemic on account of their evolution in isolation. Island countries are even richer in marine genetic species which thrive in their rich coastal and marine ecosystems. The western Pacific, for instance, is known to have the highest marine biodiversity in the world with up to 3,000 different species on one single reef. The many thousands of islands are surrounded by a rich complex of coastal ecosystems, including mangroves, sea grass beds and estuarine lagoons. On account of the small size of islands and the endemic nature of many of their genetic species, their biodiversity is extremely fragile. Minor anthropogenic disturbances that may have little or no impact on the biodiversity of continental countries have severe adverse impacts on that of small island countries. Fragility and endemicity are the two major characteristics of small islands' biodiversity that warrant urgent conservation measures. These are called for in view of the fact that island biodiversity is coming increasingly under the threat of depletion from increasing deforestation and the use of deforested land for modern agriculture, and from coastal and marine pollution in small island countries.

C. External transport constraints

59. Most SIDS suffer from the disadvantages of high external transport costs. A number of them are located far off the main sea and air routes, and this results in an automatic increase in the cost of transport to and from other countries, particularly their major trade partners and the source markets of tourists. Even the SIDS that are well connected by sea and air links suffer from the disadvantages of high transport costs because their trade partners and the source markets of their tourists happen to be distant industrialized countries.

60. Although location and distance make transport costs a problem to all countries, the problem is most severe for the tiny and widely dispersed islands of the South Pacific. The extreme smallness of most of them combined with wide dispersion in the region and high concentration of their population in a few exacerbates transport costs. As a result of distance, and the low demand for shipping services of each country, these countries suffer from very high transport costs as well as from infrequent and irregular shipping services. Air transport is limited primarily to areas of tourist potential and is very costly to operate owing to low passenger and freight demand.

III. NATIONAL, REGIONAL AND INTERNATIONAL IMPLEMENTATION

A. National implementation

61. At the national level, the foremost requirement for sustainable development is commitment to sustainability of the part of the government and society generally. Sustainability refers first and foremost to the sustainability of the economic growth and development necessary to ensure a sustained improvement in standards of living and the quality of life of people. It has become abundantly clear, however, that the single-minded pursuit of economic growth creates a potential for conflict between long-term development and the environment because the process of development tends to erode the natural capital stock, and this in turn places a constraint on sustained development.

62. The prospect for tension between development and the environment arises from two types of phenomena, namely inefficiencies present in economic systems and inequities created by socio-economic structures. The inefficiencies result from defective incentives which are attributable to (a) government failure or actions taken by the government that create incentives to use the natural capital stock wastefully, (b) market failure (this occurs when prices generated by the market mechanism fail to reflect fully the costs of production and consumption with the result that producers and consumers have an incentive to use resources wastefully and to overproduce those goods that use intensively the underpriced resources) and (c) missing markets (this arises whenever a market for an environmental resource is missing on account of undefined or unenforced property rights). Inequities are created by socio-economic structures and produce situations in which the income-earning opportunities to which marginalized groups of people, particularly the poor, have access are insufficient to sustain life without depleting the stock of natural capital. In view of these considerations, the removal of conflicts between development and the environment calls for efforts to correct market prices where they do not reflect resource costs, to enable markets where they are missing, and to alleviate poverty. It is clear that the market mechanism left to itself will not accomplish these tasks and that the active involvement of Governments is necessary. While this is true for all developing countries, the small island developing States face greater constraints, in terms of financial and human resources and institutional frameworks, on making effective interventions to safeguard environmental integrity while pursuing their growth objectives. Given a firm commitment, however, much can be done by SIDS along the path of sustainable development within the framework of Agenda 21 1/ through intensifying national efforts in the normal course of socio-economic planning. No amount of policy advice, technology, or resources available from the

international community could substitute for domestic political commitment and the political will to properly examine and implement measures for sustainable development. To say this, however, is not to downplay the importance of international assistance.

1. Major ingredients for sustainable development in small island developing States

(a) Economic policy

63. Sustainable development calls for economic policy reforms in order to remove current incentives to environmentally harmful actions. Government subsidies, concessional rates of interest, exemption from income taxation or income-tax concessions and exemptions from import duties with respect to such activities as coastal development for tourism, exploitation of mineral and marine resources, sand quarrying and so on, either by nationals or foreign investors, which lead to overexploitation and wasteful use of natural resources in SIDS, need to be removed where they exist.

64. Economic policy should certainly not be concerned only with ensuring environmental health. While that is important, SIDS need to orient their macroeconomic policy dynamically so as to achieve maximum growth. In this connection, enhancing economy-wide economic efficiency and international competitiveness will be of paramount importance for SIDS. To do so will require an appropriate macroeconomic framework conducive to economic stability. That will be necessary to remove uncertainties to the maximum extent possible, and to cope more effectively with shocks emanating from the international economy. Economic efficiency and international competitiveness will require the maintenance of realistic prices, particularly interest rates and exchange rates. In specific cases where market prices of products do not fully reflect social costs, including the cost of natural resources, adjustments would be needed through micro-economic policy instruments. Care should be taken, however, not to undermine the international competitiveness of export industries, and this is likely to happen if competitors are not required to internalize environmental costs to the same extent as domestic exporters. Trade policies should not distort the output mix by encouraging production for the domestic or regional markets at the expense of production for the rest of the world.

(b) Eradication of poverty

65. The pursuit of economic growth needs to give priority to the eradication of poverty. Even in small island developing States significant proportions of the population have been marginalized and are forced to eke out a living on marginal natural resources and thus contribute to the degradation of the meagre resources of the countries concerned. The available information indicates that in a number of small island developing States with high proportions of rural population, the proportion of that population below the poverty line is very high. Effective measures to eradicate poverty include the redistribution of productive resources (particularly land where land distribution is highly skewed) and/or the creation of non-farm employment opportunities. Non-farm employment opportunities can be created through the establishment of non-farm rural industries, urban industries, and small-scale commercial fishing, and in

the services sector, particularly tourism. This will entail expenditures in basic infrastructures and human resources development, particularly basic skill formation, but it holds out the promise of absorbing the poor farmers and the landless poor, raising their incomes and contributing to economic growth and relieving the pressure on fragile land.

(c) Land-use planning

66. Small island developing States suffer acutely from land scarcity. To make the optimum use of land resources while preventing those resources from undergoing degradation, a number of measures will be absolutely necessary, for instance:

(a) Land-use planning through land zoning or administrative allocation of land most appropriate to particular activities such as agriculture, industry, human settlements and tourism. This exercise would call for inventories of land and water resources and their susceptibilities to degradation and the establishment of geographical information systems (GIS);

(b) Environmental impact assessment (EIA) of new projects in all sectors and the selection of environmentally sound technology or the most environment-friendly technology available;

(c) Establishment of property rights to land and water resources, where such rights do not exist, so that users may have a stake in the conservation of those resources.

(d) Population policy

67. Population growth is relatively high in most SIDS and is exerting considerable pressure on their limited natural resources. With regard to action on population growth, however, individual countries will have to decide on the appropriate goals and policies. Smallness of population size happens to constitute the major constraint to growth and development of SIDS. A small population size puts a low ceiling on the extent of possible diversification of the skill structure of a small country even under optimal conditions of education and training. A limited skill structure implies a limited diversification of the output mix including export structure; and this reduces the ability of SIDS, which by necessity have to be highly open economies, to absorb external shocks. These considerations would indicate the need for a rapid rate of population growth to achieve a larger population size. It is important to bear in mind, however, that what is desirable is not a larger population per se, but a larger educated and skilled labour force. The problem that a rapid rate of population growth poses is the following: at their current levels of income, most SIDS are unable to provide for education and training up to the desired level to large additions to their population. Even more important, unless their economies are growing rapidly enough to enlarge their labour-absorptive capacities adequately, SIDS will continue to lose their trained people through emigration which will constitute a constant drain on the social capital invested in them.

(e) Legal and regulatory framework

68. A major requirement for sustainable development will be an appropriate legislative framework, and effective regulatory institutions. Since regulatory institutions will form part of the government bureaucracy, care should be taken to ensure that they are cost-effective and not amenable to manipulation by private interest groups, either domestic or foreign. Of particular importance will be the avoidance of a proliferation of regulatory institutions. In SIDS, cost-effectiveness and the need for intrasectoral and intersectoral coordination would indicate the need for the centralization of all regulatory functions in a single institution.

2. Environmental policy mechanisms: regulatory measures and economic instruments

69. In view of the limited institutional and financial capabilities of small island developing countries, their environmental standards and the policies and instruments chosen to enforce them need to be simple and cost-effective. Most environmental policy instruments fall broadly into two categories, namely, regulatory measures and economic instruments. Both have advantages and disadvantages. The best approach would be to have a mix of the two mechanisms suited to each country, and to use one or the other on the basis of their relative effectiveness and efficiency. In some cases, it may be necessary to use a combination of both.

70. Direct regulations and controls would be appropriate in SIDS when it is imperative to wholly prohibit emission of certain toxic pollutants or the use of hazardous products or substances. They can also be effective as control mechanisms. For instance, they can be used in controlling inland water pollution and marine pollution by establishing strict criteria for discharging industrial waste and sewage into inland water bodies and the sea, and in mitigating automotive pollution.

71. Typically, small island developing States offer a vast array of incentives to multinational corporations for the exploitation of their natural resources, particularly minerals, and coastal sites for tourism, and thus underprice the use of those resources. To derive full benefits from the use of their resources, SIDS need to revise these incentive structures and use appropriate economic instruments - charges or taxes - to bring the private costs of private enterprises into line with their own social costs. Economic instruments can be effectively used in SIDS in many other areas. For instance, the deposit-refund system as applied to bottles and other reusable containers would be a viable mechanism in solid waste management. Elimination or reduction of subsidies for products brought directly into the environment, such as fertilizers and pesticides, could help in reducing their impact in water pollution, soil degradation, biodiversity and human health.

3. Managing environmental problems

(a) Coping with climate change and sealevel rise

72. As discussed in section II, climate change and sealevel rise are likely to cause enormous disruption to the economies of SIDS and compromise their efforts at sustainable development. Although SIDS are in no way responsible for global warming (the underlying cause of these phenomena), they are the most vulnerable to them. The disruptions envisaged are enormous and preventive measures are out of the control of SIDS. It is difficult to imagine what effective precautionary measures they can take given the wide-ranging disturbances contemplated and what, if any, remedial measures within their means would be effective.

73. SIDS will have at least to undertake monitoring activities to evaluate changes in a number of natural phenomena such as wind patterns, rainfall patterns, atmospheric temperature, sealevel rise, frequency and intensity of tropical cyclones, frequency and intensity of coastal flooding, storm surges and so on. It has been suggested that SIDS should adopt so-called soft-engineering techniques to deal with areas susceptible to sealevel rise, storm waves and storm surges, coastal flooding and persistent erosion on the assumption that such techniques are more protective of coastal environments and require less materials and are therefore an advantage to SIDS. The effectiveness of these techniques, however, remains in doubt. What is clear is that a tremendous additional burden is being imposed on SIDS from outside in terms of human and financial resources, with respect to engaging in monitoring and precautionary activities for which they have neither the institutional and technical capabilities nor the financial resources.

(b) Coping with natural disasters

74. Even in the absence of the envisaged impacts of climate change and sealevel rise, some SIDS that suffer frequently from natural disasters need to set up adequate institutional capabilities to cope with their impacts. The major requirements for disaster preparedness as underlined by the International Decade for Natural Disaster Reduction include (a) establishment of an early-warning system including the improvement and rapid dissemination of information and warning at the national level; (b) development of capacity for hazard-mapping and risk analysis; (c) restriction of human settlements within relatively risk-free areas through land zoning and insistence on compliance with building codes; (d) development of awareness and preparedness at the local level (APELL); and (e) preparedness in terms of basic survival needs, including equipment, food, fuel, clothing, temporary shelter and medical supplies to mitigate the sufferings of victims of natural disasters.

(c) Sustainable development of human settlements

75. As seen in section II, the haphazard development of human settlements in urban and coastal areas of SIDS has contributed immensely to environmental degradation which has pervasive adverse effects on human health and on aquatic, plant and animal life. Problems relating to human settlements are not restricted to urban and coastal areas of SIDS: they exist in rural areas also; and in the rural areas of many SIDS, the state of water-supply and sanitation, and inadequacies of housing, continue to be a matter of deep concern,

particularly with regard to the spread of communicable diseases. In addition to their effect on environmental and human health, human settlements (on account of their location in areas prone to flooding and landslides), are also responsible for considerable material damage and injuries and death to people. The poor are particularly affected by human settlements located in risky areas. It is therefore a matter of urgency that authorities in SIDS adopt a strategy for ensuring wholesome human settlements.

76. A primary requirement for wholesome human settlements, as mentioned in the preceding subsection, is the restriction of human settlements to relatively risk-free areas through land zoning, hazard-mapping, and insistence on strict compliance with building codes that take into account proper sanitation facilities, particularly the disposal of sewage and polluting solid wastes, and the impact of natural disasters. Human settlement policies in the past have frequently focused on the problem of housing for the poor. The strategy most widely advocated to meet this goal, at the international level, has been to rely on upgrading of settlements as a crisis-containment action, and sites and services production to meet current and future needs. That strategy, which constituted a significant improvement on the strategy based on low-cost housing programmes, has not worked in most SIDS mainly because of the political and/or economic infeasibility of providing adequate affordable sites and services plots for the poor. In view of this difficulty, and the fact that the poor have often done considerably more for themselves than Governments have been able to do for them, a new strategy, namely an enabling one, has been proposed. The prime purpose of this strategy is to allow the authorities to determine the sets of measures that are needed at the country level to enable communities to help themselves. This calls for a fusion of government measures and assistance with local needs and initiatives.

(d) Dealing with waste problems and emerging air pollution

77. To deal effectively with growing waste problems, emphasis needs to be placed on waste prevention, minimization and reuse. Hazardous toxic materials should be banned outright. Solid waste minimization can be advanced through durable packaging, instead of single-use packaging, at least by local producers in SIDS. Establishing strict criteria for discharging industrial waste water into sewer networks and enforcing those criteria would drastically cut the costs of sewage treatment by municipal authorities. The discharging of untreated sewage into the sea by municipal authorities and private agents causes marine pollution and should be discontinued. The foremost instrument for reducing waste is the application of user charges. To be effective in affecting behaviour, however, charges need to be sufficiently high. Various mechanisms such as pay-per-bag or charge-per-can have been successful in reducing solid waste. The deposit-refund system for certain kinds of packaging has also been quite effective and can be easily implemented in SIDS.

78. With regard to municipal sewage treatment plants that ensure the elimination of pathogens, the technology is well developed. Cost-effectiveness and affordability, however, remain critical to the choice of technology. Solid waste management which includes storage, collection, transport and disposal poses different problems. The standard collection technologies imported from industrialized countries are often inappropriate, but appropriate equipment in solid waste management is available.

79. In most SIDS, outdoor air pollution is not a major problem, but it should not be allowed to grow. In urban areas, automotive pollution can be controlled by phasing out leaded gasoline, removing subsidies on gasoline where they exist and redesigning vehicle tax and licence fees to discourage the ownership of energy-intensive and polluting vehicles. Moreover, compulsory inspection and regular maintenance of vehicles could cut automotive pollution substantially.

4. Management of resources: sectoral policies and measures

(a) Sustainable management of coastal areas and marine resources

80. Aside from human resources, coastal areas and marine resources constitute the most valuable long-term resources of SIDS. Economic activities, notably nearshore fishing and harvesting of aquatic plants, tourism and non-metallic minerals (particularly sand, ground and stone) mining, will provide major sources of growth to most SIDS in the short and medium terms. For long-term growth SIDS can also depend on their EEZs. Regarding the development of their EEZ resources, SIDS need to carry out assessment of their fisheries resources and metallic and energy minerals. This can be done most effectively through regional cooperation with international assistance. SIDS that are located in oceans endowed with fisheries on a commercial scale need to make every effort to build their capacity to exploit these resources themselves in the medium and the long term so as to derive maximum benefit from them. Commercial exploitation of fisheries no doubt involves various market risks that they must assess before making substantial investments. Many SIDS will continue to gain benefits from selling licences to foreign fishing enterprises to fish in their EEZs. Many may also wish to replicate the success of some SIDS that have generated considerable economic benefits from the provision of shore facilities. In view of their critical importance for future growth, it is imperative that the development of coastal zones and marine resources be carefully planned with a long-term perspective to ensure their sustainability.

81. All activities that are currently undermining the potentials of coastal areas and marine resources need to be reviewed and appropriate measures taken to reverse past trends on an urgent basis. Non-metallic resources are of considerable importance to SIDS, and it will be important to put in place regulatory mechanisms and appropriate pricing to ensure their sustainable development. New sites for quarries need to be identified through land zoning and environmental impact assessment, and exploitation should be subject to rehabilitation of depleted quarries in order to avoid the disfigurement of coastlines. It is important to realize that coastal areas constitute the interface between sea water and freshwater coastal aquifers and no effort should be spared to ensure that the interface is not disrupted, so as to avoid the intrusion of salt water into freshwater supplies. The limited availability of coastal mining resources and the growing demand for these resources implies that their prices are rising. Although sand quarries are replenished naturally, the process takes time, and appropriate pricing is important to avoid their rapid depletion. No doubt, this implies that the cost of construction based on non-metallic minerals will be much higher in SIDS than in the past. On the other hand, the beauty of the coastline and the quality of coastal freshwater will be preserved. On balance, the outcome will be beneficial.

82. Nearshore coastal marine resources should be safeguarded at all costs. Since marine pollution is a result largely of land-based activities, including coastal activities such as agriculture, industry and urban development, measures to avoid pollution from these sources will go a long way towards preventing marine pollution. The solution lies in the scientific use of agricultural chemicals, environmentally sound technology in industry to minimize pollution from industrial effluents, adequate facilities for sewage treatment and strict criteria for the discharge of sewage, including that from tourist hotels, industrial effluents, and pollutants from port facilities into the seas. In this respect the "polluters pay" principle can be invoked, and polluters made fully responsible for the cost of the pollution they generate. Again these measures will raise short-term costs, but they hold out the promise of saving valuable resources for longer-term development.

83. As far as marine pollution caused by maritime activities of foreign ships is concerned, SIDS need to seek conventions for the prevention of such activities at the international level, and devise ways and means of monitoring compliance with those conventions through regional cooperation. Admittedly this will place a further burden on SIDS.

(b) Sustainable agricultural development

84. Agriculture may offer limited opportunities for long-term sustained growth in many small island States, but it will be an important source of income and employment for significant proportions of the population in many of those States for quite some time to come. Agricultural development will therefore deserve increased attention in the future from the point of view both of raising agricultural output and incomes and of preventing the limited land resources of SIDS from undergoing degradation. Land degradation is caused by both the rich and the poor but mostly by the rich. The rich (either nationals or multinational companies), engage in large-scale intensive agriculture using modern inputs such as irrigation, chemical fertilizers, pesticides and herbicides. The objective, no doubt, is a commendable one, namely to raise agricultural output, but haphazard construction of irrigation schemes without adequate drainage results in waterlogging and salination, and excessive use of chemicals results in pollution of inland water bodies and groundwater supplies. Intensive cultivation is what is needed in small countries given their meagre land resources; but care should be taken to utilize modern inputs in a scientific manner through environmentally sound irrigation systems, and education of farmers in the optimum use of water and agricultural chemicals. Construction of irrigation systems should be subject to strict regulations, and impact assessments made mandatory. Use of water on large farms can be controlled through appropriate user charges, and use of fertilizers and other agricultural chemicals through appropriate pricing.

85. Land degradation is also caused by the poor when for various economic and sociopolitical reasons they are driven into marginal land. Degradation of marginal land occurs primarily because the poor are not provided with the infrastructure, and cannot afford the requisite inputs, necessary to move beyond subsistence or low-yield farming and are forced to mine the soil. To avoid the degradation of marginal land - depletion of soil fertility, soil erosion and so on - it will be necessary for SIDS to change the patterns of cultivation of marginal land. It is well known that the type of farming that is economically

and ecologically sustainable on marginal land consists in intensive cultivation of non-food crops: perennial bush and tree crops such as coffee, nuts, cocoa, rubber, fruits and vines, and not field crops such as rice, beans, squash, maize, tubers and other traditional ones. Poor farmers should therefore be enabled to switch from low-yield traditional field crops to sustainable high-yield commercial farming. This type of farming will require better transportation and marketing facilities which should not be too difficult to provide in most SIDS, and more capital inputs at least initially; but it holds out the promise of raising the incomes of the poor and providing plant cover to the land, thus preventing further degradation.

(c) Approaches to halting deforestation and promoting afforestation and reforestation

86. In view of the fact that most deforestation occurs for purposes of agricultural production, one approach to arresting and reversing the process in SIDS lies in agricultural expansion into high-yield and marginal land as discussed above. Intensification of agricultural production in high-yield areas will make it unnecessary to clear more forests and may well free land (which can be reforested) from agriculture. Intensification of agricultural production in marginal land through a switch from field crops to tree crops will at the same time amount to reforestation. This may serve as a medium-term solution and may not be effective in all SIDS. The most effective solution to reforestation in SIDS, which are endowed with so little land, is through the creation of non-agricultural employment, in order to take land out of agriculture for reforestation.

87. Afforestation and reforestation are badly needed in many SIDS to meet the supply of fuelwood in the future. Since the major alternative source of energy will be imported oil which is extremely costly to SIDS, afforestation and reforestation to meet the need for fuelwood are a viable economic proposition in many of them. Reforestation in many of them is also necessary for the restoration of degraded watersheds so as to increase water-supply to meet growing demand. Such reforestation obviously has immense economic benefits given the limited natural availability of freshwater in SIDS. Afforestation to produce fodder can both help the poor and mitigate the pressure on limited pasture lands, and prevent their degradation while providing a constant supply of fodder. Generally, afforestation and reforestation will serve the useful purpose of preventing floods by slowing down run-off as well as curtailing soil erosion.

(d) Managing water resources

88. In order to ensure that the limited amount of water that is provided to SIDS through the hydrologic cycle is adequate to meet their still-growing demand, it is necessary to reverse the past trends of water consumption, to find innovative ways of conserving water and to develop new water-supplies.

89. The immediate course of action must centre on water conservation through rational utilization of water resources and use of efficient technologies. In SIDS where irrigation makes a substantial claim on freshwater resources, raising the efficiency of irrigation cannot be overemphasized. First it will be important to adopt an agricultural policy in balance with the available water

resources that will ensure the sustainability of agricultural development. Efficiency of water use in irrigation can be enhanced in several ways, namely,

(a) Education of farmers on the optimal water needs for crops in various places. Farmers could drastically reduce water withdrawals by scheduling their irrigation according to actual weather conditions, evapotranspiration rates, and soil moisture and water requirements for particular crops;

(b) Improving irrigation technology. Lining irrigation canals can save water by minimizing seepage, and using drip irrigation instead of gravity flow or pivot sprinkler systems can cut water use drastically;

(c) Better maintenance of municipal water distribution systems to prevent leakage. Leakage in distribution systems is generally very high and there is considerable room for improvement;

(d) Water pricing. Users who have to pay for water will have an incentive to use only the amounts they really need. Water pricing would promote a more economical use of water as well as its more efficient allocation among various uses.

The aim should be to achieve not necessarily full cost recovery of irrigation systems, for such an aim would overburden poor farmers, but rather a more efficient use of water resources; and this, at the same time, will prevent environmental problems such as salination and waterlogging of agricultural land which are the result of profligate use of water. In household and other municipal uses of water, including tourism, efficiency of use can be particularly increased through using improved fixtures and appliances and by installing individual water-metering systems where they do not exist.

90. With regard to increasing freshwater supplies, first and foremost it will be necessary to keep their natural availability free of pollutants. This will call for economy-wide measures of pollution control that can be implemented through economic mechanisms within the framework of polluters pay principles and/or through command and control mechanisms. Lower quality or brackish water can be used for selected purposes. It may also be feasible to increase natural availability by increasing rainwater catchments and storage units. Rainfall-harvesting techniques could be used to increase groundwater recharge and as a source of supplementary irrigation water. Efficient methods of groundwater extraction would help control the intrusion of salt water into freshwater aquifers, and increase the availability of freshwater. Watershed restoration would cut losses of natural freshwater availability by slowing down run-off and add to natural freshwater availability. There are several (though not many) technically feasible or economically viable new ways of increasing freshwater availability. The options include seeding of clouds to induce precipitation, desalination of sea water, towing of icebergs and transportation of water by tankers.

(e) Sustainable industrial development

91. In the foreseeable future, as discussed in section I, SIDS embarking on the path to industrialization will most likely concentrate on light manufacturing in such areas as textiles, micro-electronics assembly, watchmaking, jewellery and

offshore computer-based record processing; these activities are not highly polluting because they do not involve the processing of raw materials and are not energy-intensive. At any rate, all new projects whose environmental consequences are in doubt should be subjected to environmental impact assessment. Special effort will be needed to guard against multinationals' transferring their polluting industries offshore. SIDS receiving such industries should carefully balance the financial benefits derived from them against the nefarious effects of pollution on the environment and on human health, and their impact on other major activities particularly tourism. This can be done through comprehensive cost-benefit analysis.

92. In the special circumstances of SIDS, industrial development will be an uphill struggle. Each SIDS will need a carefully designed industrial policy to suit its capabilities. In addition to an appropriate economic policy framework and an export-oriented trade policy as discussed above, an array of support measures will be required. It will be necessary to search for non-traditional industries and activities that do not require much technological sophistication and can be remunerative on small scales. An equally important requirement will be industrial policy's having adequate built-in flexibility to phase in and phase out activities as indicated by international competitiveness so as not to burden the economy with uncompetitive production structures. Reliance on external trade for growth will require knowledge of the evolution of global market trends in areas of interest to SIDS as well as efficient marketing and distribution skills. To meet investment needs, domestic savings which are relatively low in many SIDS need to be enhanced and foreign investments, whether direct or portfolio, encouraged. It cannot be overemphasized that in order to survive and grow in an increasingly competitive world, SIDS will have to stress efficiency in production to minimize production costs and enhance international competitiveness. In this regard, in addition to the need for training in appropriate skills to raise productivity, it will be necessary to avoid labour market disruptions. This could be achieved through the education of the labour force and labour leaders with the aim of building an enlightened labour movement that can establish a relationship between the rise in real wage rates and productivity growth.

(f) Measures to increase local energy supplies and energy conservation

93. SIDS need to undertake comprehensive national energy surveys in a systematic manner. Considering the magnitude of the oil dependency of these countries, priority should be given to the promotion of exploration and development of indigenous hydrocarbon resources especially in the exclusive economic zones. However, since petroleum exploration is costly and carries very high risks, redoubled efforts through appropriate policies and legislation should be made to attract private sector capital. If private capital cannot be attracted, consideration should be given to speculative seismic surveys with assistance from bilateral and multilateral sources. With regard to new and renewable sources of energy, given the potentials in SIDS for abundant solar, wind and ocean resources and their considerable hydropower and geothermal potential, avenues of bilateral and multilateral assistance should be explored for their further development. As discussed above, considerable progress has already been made in the area of solar energy for photovoltaic systems as electric power sources, and its application in some SIDS shows that it is a feasible and viable source of energy for the future. This source of energy

deserves more attention in the years to come. The other source of considerable promise is ocean thermal energy conversion (OTEC) which utilizes the temperature difference that exists in the water column to generate electricity.

94. On the consumption side, national surveys should be carried out on the main consuming sectors with special emphasis on the rehabilitation of existing powerplants which often operate inefficiently. In many SIDS, there is scope in the medium term for conserving energy, for example, by gradually phasing out energy-inefficient machinery, transportation vehicles and light-bulbs. Appropriate electricity pricing can be used to minimize household electricity consumption, and tax differentiation with respect to gasoline (a great deal of which is used in pleasure driving, particularly in the higher-income SIDS) can be used to reduce its consumption. A major conservation measure would be to encourage the use of public transportation, particularly in the higher-income SIDS, where in addition to profligate energy use, urban vehicle congestion and air pollution are emerging rapidly. This could be addressed by measures to encourage the supply of public transportation and to discourage the use of private motor cars inside major urban centres, through the use of entry tolls where possible and/or appropriate parking charges.

(g) Mineral resources development

95. In the area of mineral resources the task of Governments will be:

(a) To compile an inventory of known mineral resources. This will help in the planning and the development of these resources;

(b) To carry out prospecting of as yet unknown mineral resources. This could be done more effectively through regional cooperation and international assistance.

96. Sustainable development of known mineral resources will require the right policy climate in which the development of those resources can flourish to the benefit of the economy without adverse environmental consequences. In the formulation of fiscal and monetary policies care should be taken not to distort incentives through taxes, subsidies and interest rates that will lead to overexploitation of scarce mineral resources. At the microlevel, environmental impact assessment of projects to determine negative externalities should be combined with appropriate economic instruments - charges and taxes to ensure the equalization of private and social costs. The problem of the pricing of mineral resources, inasmuch as they are exhaustible, remains a contentious issue because it involves intergenerational equity. The major issue relates to the choice of an appropriate discount rate. The general view, however, is that the discount rate should be very low, and this implies a high present value of those resources. At any rate, to do justice to intergenerational equity, the optimal rate of exploitation of mineral resources should be that at which renewable resources can be substituted for depleted mineral ones and/or technological capability built up to increase the overall productive capacity of the economy.

(h) Sustainable tourism development

97. Considering the influence of handicaps and risks inherent in the economic structure of SIDS, a tourist development policy would contribute to reducing

island-specific vulnerability if it is part of a sustainable development strategy to enhance the economic structure while preserving the natural environment.

98. The environment on which island tourism is based is often fragile. Tourism development projects should be considered only if they comply strictly with environmental policies, in particular those reflected in guidelines for coastal and marine resource management. For example, development of a beach resort should not cause excessive sand removal or destruction of mangroves; anchoring of yachts in a bay in the absence of an equipped marina should not lead to bleaching of corals. As large numbers of tourists can also cause different forms of physical degradation in a small island environment, tourism development should be geared to attract the most affluent segments of overseas tourist markets. Furthermore, management and development of tourism should take into consideration, and attempt to mitigate, the possible negative cultural effects that may accompany the large influx of foreign visitors to traditionally isolated small island cultures by maintaining an equilibrium between what the island society is prepared to supply in terms of non-traditional island goods and services in order to attract tourism, and the adaptation tourists have to make to the traditional natural and cultural island environment. In SIDS where previous tourism development has already created an infrastructure to accommodate a large number of visitors, careful monitoring of the environmental impact of tourist activities and physical planning of further development are imperative.

99. Tourism development can be pursued with less physical impact if it relies on already existing infrastructures, rather than involves physical expansion of construction, or if it is based on less fragile elements of the natural environment. Concerning the latter possibility, it is generally admitted that water-based activities, as long as they are subject to proper monitoring, entail less pressure on the physical environment than land-based activities in small islands catering to tourism. Yacht chartering, boardsailing, sports fishing, scuba-diving and other water sports are often professionally run, and usually subject to tight regulations concerning environmental issues such as the disposal of waste or the protection of the seabed. For example, in spite of its high tourist per capita ratio, the British Virgin Islands has not suffered from excessive tourism pressure on its physical environment or its society.

100. While in SIDS tourism development has always been based on the environment, new approaches to tourism and the environment suggest that the tourism sector has room for diversification along environmental lines, and that the exploitation of elements not exploited traditionally can offer opportunities for balanced tourism development. Environment-led tourism activities include mountaineering and nature-based exploration (attraction to island fauna and flora). Such activities are successfully encouraged, for example, in Dominica and the Seychelles, which are endowed with luxuriant natural sites and have become known destinations for so-called eco-tourism. Specialized forms of tourism capitalizing on environmental assets emphasize certain types of activities such as sports and medicine (for example, thalassotherapy, that is sea-water therapy, based on the virtues of marine elements such as algae). The idea of offering surgery services as well as hotel privacy on the same island has been successfully exploited in a few small Caribbean States. Regional and

subregional cooperation can help minimize costs and maximize returns to investments in tourism. This is elaborated upon in the next subsection.

101. Being environment-based, growth of tourism in SIDS will depend considerably on their environmental quality. Particularly important will be drinking-water quality, solid and liquid waste management, coastal water quality and good sanitation. Tourists encounter these elements on a daily basis during their stay, and breakdowns in these systems have serious implications for their health.

(i) Conserving island biodiversity

102. Conservation of biodiversity ranks high on the international agenda for sustainable development. In this context, island biodiversity, being endemic and fragile, deserves particular attention. In SIDS, conservation of biodiversity will go hand in hand with efforts at arresting deforestation and marine pollution and overexploitation of marine resources, particularly nearshore marine resources. In order to guard against the eventuality of destruction of valuable endemic plant and animal species, given the constant pressure of population and economic growth, efforts are needed to undertake ex situ conservation in gene banks. However, since not all species can be preserved in gene banks, in situ preservation remains the most effective approach to conservation of biodiversity.

5. Capacity-building for development and environmental management

103. To put the economies of small island countries on a sustainable course, national capacity-building needs to be given the highest priority. In simple terms, national capacity includes the institutions necessary for promoting development activities and for managing the resource base, and the human resources necessary to meet the needs of development and for environmental management. It is evident that concerns about sustainability have added a new dimension to the development endeavour which implies the need for additional resources. For small island developing States whose total capacity will always be limited, this amounts to an additional constraint to growth, and calls for special efforts to augment their capacity.

104. To ensure coherence in capacity-building, a major requirement at the national level will be to formulate a consistent development strategy in order to identify the long-term development priorities at the sector and subsector levels. The identification of such priorities is indispensable for the planning of institutions and human resources necessary to meet the needs of particular sectors and subsectors. In small island countries without diversified economic structures and that can diversify only slowly and only to a limited extent, there is no room for a mismatch between needs for development activities and the training of human resources. This becomes particularly important in view of the tradition of migration of skilled people characteristic of small island countries. A better fit between needed skills and training of manpower is necessary both to meet national manpower needs and to reduce the emigration of trained people. Much can be achieved in SIDS in capacity-building through

regional cooperation and technical cooperation provided by the international community. These issues are discussed below.

105. National capacity for environmental management must be achieved at both the macroeconomic and micro-economic levels. At the micro-economic level, there is a need for capacity (a) to evaluate environmental benefits and costs of development projects in all sectors in order to specify desirable standards and targets for environmental quality, (b) to design a legal and regulatory system to achieve those standards and (c) to monitor economic activities and ensure adherence to the law and regulatory standards. At the macrolevel, it will be necessary to build or strengthen capacity to formulate policies conducive to growth and development, which at the same time will ensure the maintenance of national capital stock.

106. It must be recognized that capacity-building for environmental management will entail substantial costs and necessitate the diversion of part of the resources available for development purposes to environmental management. This will place a particularly heavy burden on SIDS. In addition to the financial costs of training and capacity generation, environmental management will tax their meagre human resources as significant proportions of their trained labour force are allocated to environmental activities.

107. In small countries, national capacity-building is confronted with a size constraint that effectively limits the extent of the division of labour and the specialization that can be achieved. It is also the case that a wide range of specialized institutions and human resources cannot be efficiently utilized in small economies. SIDS should therefore avoid the proliferation of specialized institutions and human resources so as to avoid suboptimal and wasteful use of their scarce financial and human resources. Capacity-building both in terms of human resources and institutional facilities ought to adopt a multidisciplinary and multisectoral approach. Such an approach would make relatively less demands on human resources and the resulting capacity would be more efficiently utilized and more suited for intersectoral coordination.

108. Any strategy for endogenous scientific and technological capacity-building in SIDS must take into account the fact that these countries are constrained by small manpower and inadequate infrastructures and for a long time to come will be depending on a few industries. They have few opportunities for vertical integration because of the need to maintain flexibility in adapting to changes in global market conditions over which they have no control. They are also constrained in their capacity for endogenous technology creation. SIDS must therefore place greater emphasis on the capacity both to acquire technology available in the international market on the most economically advantageous terms, and to operate and maintain such technology.

109. While some SIDS can effectively and usefully build up research and development capabilities in one or two sectors that are of long-term importance to their economies, generally it is not feasible for SIDS to invest in research and development in wide-ranging activities. While even at the level of operation and maintenance, the needs for a technical mix will differ among SIDS, there are a few areas in which adequate skill development would benefit most, if not all, SIDS, namely those in telecommunications, including satellite communications and information technology. Telecommunications represents an

important tool in overcoming the disadvantage of remoteness that characterizes most SIDS. It can facilitate immensely activities such as export-processing, offshore financial services and tourism. In order to benefit fully from the advantages of modern telecommunications systems, some SIDS would need external assistance, particularly with respect to the international infrastructures required. Another area of emphasis at the national level in SIDS would be the development of skills for the use of information technology. As the cost of document- and data-processing activities rises in the industrialized countries, those activities may move rapidly to the developing countries that have adequate technical skills and are well integrated into the international telecommunications network. Although they will have to meet competition from other developing countries, many SIDS could take advantage of this trend to diversify their economies.

110. At the primary and secondary levels, the educational performance of SIDS, except for those that are in the least developed category, has been better, compared with that of many other developing countries. In view of the fact that human resources constitute the most important resource of SIDS, greater efforts are needed to increase coverage, particularly at the secondary level. The fundamental problems of outmoded curricula dating back to colonial times, which are not geared to the present development needs of these countries, remain; and they need to be tackled on an urgent basis. In brief, there is a need to reorient school curricula to give greater emphasis to subjects such as mathematics and the sciences that serve as the basis for acquiring technical education. Technical training should actually be integrated into the curricula, particularly at the secondary level. Similarly, at the tertiary level, the educational programmes need to emphasize the medium- and long-term development needs of these countries, while keeping in mind the crucial importance of higher education for capacity-building in SIDS. In this area SIDS can benefit tremendously from pooling their resources at the regional level. At all levels, it will be necessary to introduce appropriate courses on sustainable development.

111. A crucial element of capacity-building will be the creation of an adequate legal framework and enforcement capacity, and appropriate regulatory institutions. Without these structures it will be impossible to achieve sound environmental management either through command-control or economic mechanisms.

6. Enhancing external transportation facilities

112. Enhancement of transportation facilities of SIDS will require efforts at the national level as well as cooperation at the regional and international levels. National efforts are needed in the building of infrastructures such as harbours, ports and airports for external transport in each country. Regional cooperation by way of joint ownership, operation and maintenance of the means of transport - ships and aircraft of appropriate size - would reduce the financial burden of each country and make for cost-effectiveness. In view of the bulky investments entailed both by the infrastructures and the means of transport, international assistance is warranted to supplement efforts at the national and regional levels.

113. In view of the fact that SIDS are highly open economies and depend to a significant extent on external trade and tourism, the transport sector has a catalytic role to play in the economic and social development of these countries. While efficiency in the sense of cost-effectiveness should be kept in mind in formulating policies and programmes for the development of the transport sector, it should also be realized that improvement of transport facilities will require heavy investments in basic long-gestating infrastructures, and therefore cost-effectiveness should be evaluated from the long-term viewpoint.

114. The present high transportation costs of most SIDS are accounted for mainly by the distance between them and their industrialized-country trading partners, but it is not necessarily a problem that all of them will have to cope with indefinitely. At present most SIDS trade very little with continental developing countries that are located within proximity to them because of a lack of complementarity in production and trade between those countries and SIDS. As the continental developing countries grow and diversify their economies, complementarities between their economies and the economies of SIDS will gradually evolve. Such complementarities will lead to a change in the direction of trade of SIDS towards the continental developing countries within proximity to them, thus reducing transportation costs drastically in most cases. This, however, will take time.

115. Thus far, the sea and air transport infrastructures of SIDS have developed to varying degrees. The high-income SIDS, especially those that are growing at a rapid pace, have made the most progress from their own resources supplemented by international assistance. The growing trade volumes and air traffic of these countries will require further expansion of harbour, port and airport facilities. In these countries, expansion of seaport facilities are economically justifiable, but since they will involve substantial heavy investments, international assistance is warranted, particularly to ensure that SIDS do not resort to desperate attempts at capacity expansion that may result in environmental degradation.

116. As far as the poorer, more isolated, smaller and more widely dispersed SIDS are concerned, transportation facilities are likely to remain meagre and costs very high for a long time, because of their more limited potential for growth and growth of demand for air and sea transportation services in particular. The best course of action in the immediate term in most of these countries where formal seaport facilities are not available and where it is the practice to load and unload cargo and passengers in mid-sea using a ship's boats will be to build improved facilities such as jetties that are sturdy enough to accommodate small country-owned vessels larger than ships' boats for transhipment purposes with international financial and technical assistance. For longer-term purposes, it may be necessary to develop minimal harbour and port facilities gradually as justified by their prospects for growth, particularly in export and import services, with international assistance. To enable these countries to develop their tourism potential to a fuller extent, regional cooperation with international assistance would be necessary to develop cost-effective air links between them and larger countries within proximity to them.

B. Regional implementation

117. Small island countries stand to gain much from close cooperation at the regional and subregional levels. In fact, regional and subregional cooperation offers the only opportunity for small island countries to avail themselves of economies of scale in a number of areas such as higher education and training, and air and sea transport. The low levels of effective demand of single countries would make institutions of higher learning and skill formation uneconomic and therefore unviable. Likewise, the massive investments involved in air and sea transport would not be financially feasible. They would in any case be economically unjustifiable if reliance was placed mainly on the demand for such services from single countries. These considerations have certainly not escaped the attention of small island countries. Considerable effort at regional cooperation has already been made with regard to a variety of activities.

118. Among the areas that offer considerable scope for the development of small island countries are their exclusive economic zones and tourism. Again the paucity of financial and human resources will pose a constraint for a long time to come or even indefinitely with respect to each country's exploiting singly its marine fisheries resources optimally and maximizing incomes from tourism. Small island countries that currently negotiate with foreign fishing companies individually can maximize their returns from leasing their fisheries resources to them if they bargain with those companies as a block. Coordinated action will also enable participating countries to avoid unsustainable exploitation of their fisheries resources and resolution of conflicts in connection with their migratory and straddling fish stocks. Much the same is true in the area of tourism, particularly for small island countries that are distant from rich countries which are the main sources of their tourists. Competition among themselves in this area will result in duplication of facilities in all the islands, many of which will operate below capacity. Maximization of income from tourism will call for coordinated development of tourism facilities with countries specializing in different attractions on small scales. Efforts need to be made to look for ways of increasing service differentiation. In addition to maximizing returns on investments in tourism, this approach will also enable island countries to develop their tourist industries in an orderly fashion and at a slower pace and thus avoid adverse environmental consequences of tourism development. The higher the return from their investments in tourism, the more they will be able to invest in environment-friendly tourism development processes.

119. Regional cooperation will also be necessary to manage the natural resources of small island States and to prevent their degradation, for instance through the dumping of hazardous and toxic wastes and sewage by individual countries in the region or by enterprises from countries outside the region. It will also enable island countries to deal more effectively with foreign companies in connection with accidental spillage of pollutants such as oil, and the transportation of hazardous materials such as nuclear fuels and nuclear wastes through their waters. In this connection what is needed is a regional convention on the ban of import into island countries and the control of transboundary movement of hazardous wastes. The Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement of All Forms of

Hazardous Wastes within Africa, signed by African countries, is an example of such an arrangement.

120. Sustainable development will call for the choice of environmentally sound technology. This can be achieved only if SIDS have the capacity to identify the availability of such technology and its effectiveness and efficiency. This is a complex process, especially in so far as the procurement of technology is a multi-step process, where not only such issues as capacities, product-quality assurance, technical training in operation, repair and maintenance and guarantee of supply of spare parts and components have to be evaluated, but also a techno-economic analysis of the technology and its compatibility with other machinery and equipment, and with the environment, is required. While it may be feasible for some SIDS to build technology assessment capabilities in particular sectors, creation of technology assessment capacities for comprehensive technology assessment covering all sectors will not be cost-effective in SIDS at the national level. SIDS could, however, avail themselves of the technologies best suited to their purposes through the creation of technology assessment centres at the regional level.

121. The benefits of regional and subregional cooperation are obvious. Some efforts at cooperation and institution-building for cooperation have been made; but much remains to be done. The existing institutions need to be strengthened and made more effective. The evolving patterns of regional cooperation need to be adopted by all island countries. Effectiveness of regional cooperation will depend on the political will to cooperate, and on adequate financial and human resources to make regional institutions fully functional. Greater efforts are needed in the area of air and sea transport where regional cooperation is weak or non-existent. Regional cooperation would be viable with regard to the means of external transport. For such cooperation to be feasible, however, a primary requirement is the availability of the necessary infrastructures in each country. Since the construction of such infrastructures involves large capital outlays, international assistance would be necessary to supplement national efforts as discussed above in the subsection on enhancing external transport.

C. International implementation

122. Most small island developing States benefit from or are eligible for concessional schemes in the areas of finance and trade intended to provide international support for the development efforts of developing countries generally or for certain categories among them such as the least developed, the sub-Saharan, the Caribbean and the Pacific developing countries. The new concerns and requirements for sustainability, however, will overly strain their current meagre financial and human resources. To pursue their development objectives in the context of sustainability, those countries will be depending to a greater extent than heretofore on the support of the international community. Some priority areas in which SIDS could cope with their problems more effectively with adequate international support are:

(a) Enhancement of disaster preparedness and management of disaster risks. Efforts in this area involve preparation of investment projects with specific relevance to cyclones and sealevel, strengthening of early warning systems, disaster relief mechanisms and assistance with preventive measures. Problems

relating to natural disasters, particularly inclemencies of weather, are long-standing problems with which SIDS will have to be prepared to cope indefinitely. Problems relating to sealevel are actually negative externalities resulting from production and consumption patterns in the rest of the world, but to which SIDS are the most vulnerable. In this area, in the framework of the polluter pays principle, it is easy to see that SIDS deserve maximum support;

(b) Environmental management: coastal zone management, preservation of island ecosystems and biodiversity. Coastal zone management is costly, and so is the preservation of ecosystems. Preservation of biodiversity involves an opportunity cost to SIDS in terms of forgone income that could be realized through the exploitation of their natural resources. What is more, preservation of island biodiversity at the same time constitutes a potential benefit to the world at large in terms of the potential uses of plant and animal genetic species by the international community. In view of these considerations, it is to be expected that the international community will extend full support to SIDS in their environmental management efforts;

(c) Exclusive economic zones of SIDS. Their exclusive economic zones are an asset to SIDS that on account of constraints posed by human resources and particular know-how they are unable to exploit at the present time. In this area international assistance targeted to the identification of specific opportunities for using marine resources including exploitation of seaweed and other marine potentials for food, fuel and animal feed and fertilizer will constitute cost-effective investments conducive to greater self-reliance and sustainable development;

(d) Energy. Many SIDS, on account of their location off the main shipping routes, pay exorbitantly high prices for imported fuels, and have very little by way of biomass fuels, particularly if they preserve their forestry resources to the fullest extent for the sake of preserving biodiversity. International assistance in the area of new and renewable energy - for instance from solar, marine, wind, geothermal and hydropower sources - would help decrease their dependence on costly petroleum imports and at the same time reduce the adverse effects of fossil fuels on the environment;

(e) Air and sea transport. Movement of people and commodities to and from many SIDS is seriously impeded by the infrequency, unreliability and high costs of sea and air transport. This has adverse effects on the trade and tourism of SIDS. In this area, as discussed above, the best approach for SIDS would be to find viable solutions partly at the national level and partly at the regional level. Their efforts at finding solutions at the national and regional levels would certainly be speeded up tremendously through financial and technical assistance from the international community. At present not only are the transport costs beyond their means, but even more so the fixed costs of the infrastructures required. At the initial stages, SIDS will need support by way of studies concerning the types of cost-effective air and sea transport systems that would meet their needs, including assistance in the design, construction and testing of new types of ships and aircraft and in the construction of necessary infrastructures;

(f) Telecommunications. For SIDS to be able to promote their export industries and tourism successfully, they need to be more fully integrated into

the international telecommunications networks, including satellites. While SIDS would pay for the services provided, the establishment of the appropriate infrastructures is beyond their means;

(g) National capacity-building. As mentioned above, a crucial requirement for the sustainable development of SIDS is the development of their human resources and development institutions, at the sector and subsector levels. The international community already has in place facilities for technical cooperation for capacity-building. So far, however, those facilities have devoted their efforts largely to implementation of specific projects, and very little to capacity-building. In the future there is a pressing need, as has been recognized by the international community, for technical cooperation to emphasize capacity-building. The responsibility of SIDS in this respect will be to clearly identify their needs at the sector and subsector levels. In this connection, the assistance of the international community in supporting and strengthening capacity-building institutions of SIDS at the regional level where they exist would be invaluable;

(h) Transfer of technology. In view of the near-total reliance of SIDS for technology on the industrialized countries, and the fact that sustainable development depends so much on environmentally sound technology, the international community should make every effort to ensure the transfer of the most environment-friendly technology to SIDS, and at the lowest possible cost to them;

(i) Cooperation with other developing countries. The benefits of regional cooperation have been discussed above. SIDS stand to gain much also from cooperation with other developing countries bilaterally, in various areas of interest to them. In almost every area of concern to SIDS there are other developing countries where much work has already been done. To benefit from the experiences of other developing countries, SIDS need to look for and establish appropriate institutional modalities that will enable continuous cooperation;

(j) Modalities of external assistance. The modalities of external assistance to SIDS should take into account not only their per capita income, but also the fact that while they are open economies, their export revenues are meagre and subject to severe fluctuations owing to external demand shocks and natural disasters, and that this makes it difficult for them to meet external financial obligations in a timely manner. This consideration warrants non-debt-creating external assistance. Whenever external assistance takes the form of loans, the international community should make an effort to provide loans with the highest grant element possible so as to keep their debt-servicing burden low and manageable. Furthermore, in view of the fact that SIDS are subject to frequent external shocks and have very low capacity to absorb such shocks in the sense of maintaining their consumption and investment rates in spite of them, provision needs to be made to make available to them adequate balance-of-payments support as required to absorb demand shocks from abroad. So that they may be able to cope with severe natural disasters that affect their export earnings and result in damages to infrastructure, crops and housing, they also need emergency budget support. In the absence of such support, the fact that they will have to cut back on essential imports and/or social expenditures and government investment programmes every time they are hit by exogenous shocks will make sustainable development an elusive goal. Development assistance meant

for sectoral and subsectoral purposes and institution-building needs to make provision for recurrent costs in order to keep projects from collapsing after completion, upon the withdrawal of external support;

(k) International trade policy towards SIDS. In view of the export orientation of SIDS, the availability of market access for their exports is of vital importance. Favourable conditions, as already provided to SIDS under such arrangements as the Lomé Convention, the Caribbean Basin Initiative and the South Pacific Regional Trade and Economic Cooperation Agreement, need to be improved to take into account the special needs of SIDS. The rules-of-origin requirements, for instance, could be modified and made less stringent. This would enable SIDS to diversify their exports and reduce the impact of external demand stocks without having to acquire the capability to produce highly capital- and technology-intensive parts of products that are beyond their means. Commodity price support is an inefficient policy and efforts are currently under way at the international level to persuade countries that support domestic commodity prices to abandon that policy. It may, however, be worthwhile to examine the case for price support for the major agricultural commodities on which SIDS will depend in a world of liberalized agricultural commodity prices. Wide fluctuations in the prices of agricultural commodities will not be conducive to sustainable development. Reduced earnings from agricultural exports when their prices collapse will affect the ability of private agents as well as Governments to adhere to sustainable practices.

Notes

1/ Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8), resolution 1, annex II.